

2016 Operations and Construction Highlights



Board of Directors
December 1, 2016

Health & Safety

- **Zero** employee lost time injuries in 2016 YTD
- **Two** minor (no injuries) at-fault vehicle incidents in 2016 YTD (~1.5M miles traveled by year end)
- **Third-party review** — ongoing contract with independent third-party safety inspector helps ensure continuous improvement by integrating emerging best practices from across all relevant industry sectors — 66 audits conducted in 2016 (159 total)
- **Good catch/near miss** program — employees actively report on “operational experiences” — end-of-day reviews capture work practices identified as needing improvement, efficiencies gained through new and better practices, and hazards to avoid when performing similar work — information is consolidated in a growing database, cataloged and referenced by job type — data broadcast via email to all frontline supervisors and managers — capturing these experiences is critical to creating a proactive improvement safety program — 100 YTD in 2016
- **Job hazard analysis** program — empowers employees to create a library of hazard descriptions and mitigation strategies for over 120 different work procedures — growing library is accessible to all employees via intranet — field crews carry and refer to a hard copy of “JHAs” during pre-work tailboard talks

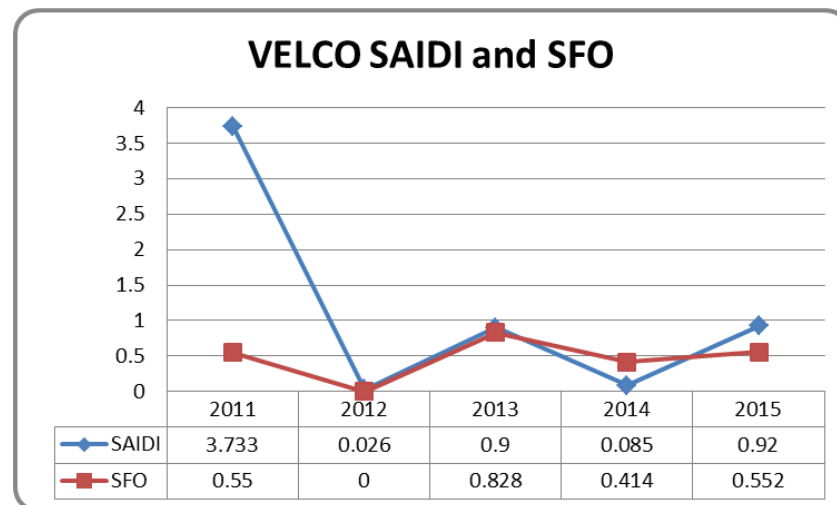
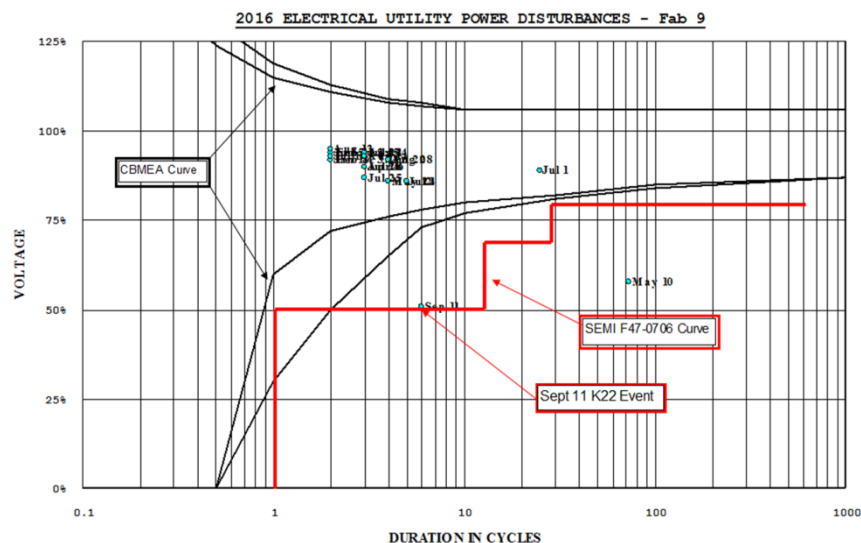
System performance 2016

Two outages impacted distribution customers in 2016 YTD

- St. Albans failed bus VT (5,794 customers for up to 75 minutes)
- E. Avenue squirrel contact (2,084 customers for up to 9.7 minutes)

Three forced outages impacting transmission reliability in 2016 YTD

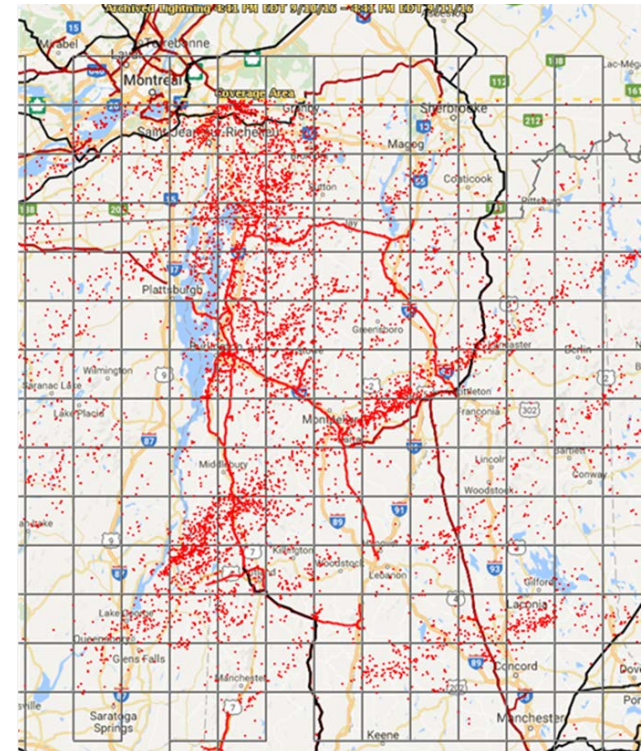
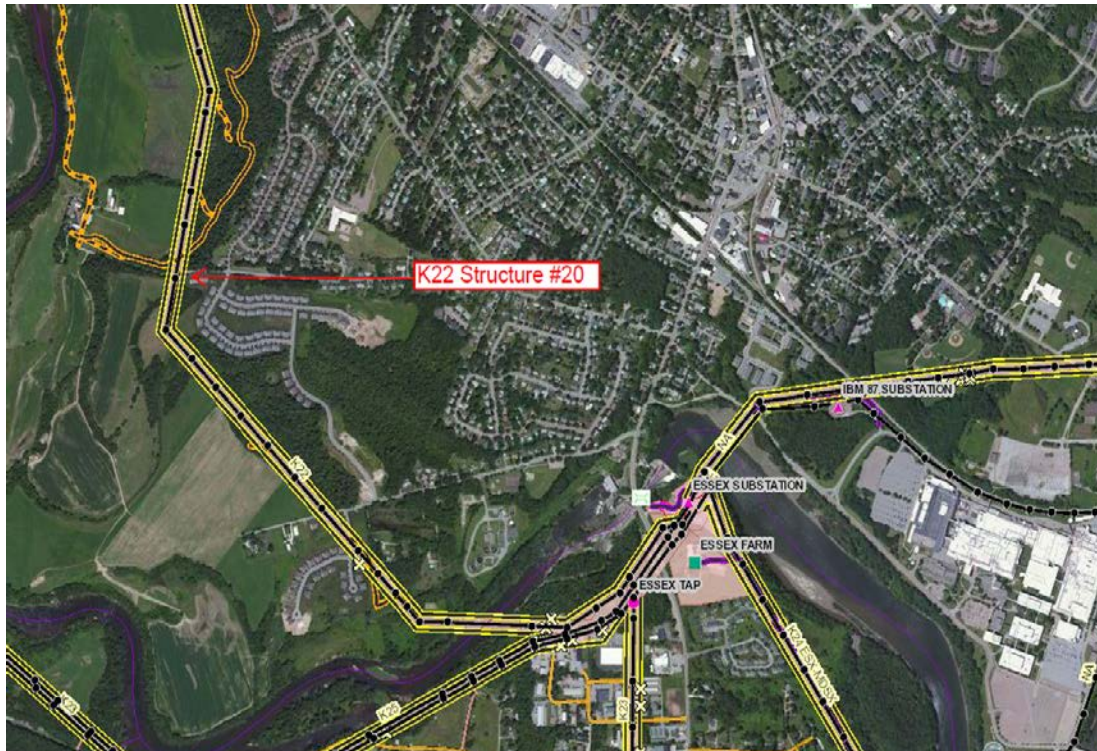
- Essex — Sand Bar K22 line, failed conductor splice
- Sand Bar — PV-20 phase-shifting transformer oil leak
- Georgia-Highgate-St. Albans-Converter K42 Line, St. Albans — switch low SF-6 gas
- Granite-Chelsea-Hartford K50/51 line — failure to automatically reclose



System performance 2016

One power quality impact in 2016 YTD

- Essex — Sand Bar K22 line fault during lighting storm
- Ten lightning strikes in less than one second, all concentrated over K22 corridor
- Fault located 1.6 line miles from VELCO Essex
- Global Foundries reported 1,440 lost tool hours



Maintenance work

- Completed all high-priority line maintenance identified during routine inspections — condemned poles identified by Osmose Utilities Services, Inc., are scheduled for replacement by end 2016 (2 poles on K34)
- All NPCC-driven system protection work at required substations is scheduled to be complete by end of 2016
- Four dissolved gas monitors to be commissioned by end of 2016 on system critical transformers, allowing for remote oil analysis (West Rutland T2, New Haven T2, Vermont Yankee T4, and Irasburg) — VELCO technicians will be training by GE on commissioning process so future installs will be performed completely in-house
- Maintenance performed on Sandbar phase shifting transformer load tap changer

Maintenance work

K22 Conductor Splice Failure



Vermont Yankee T4 Leak Repair

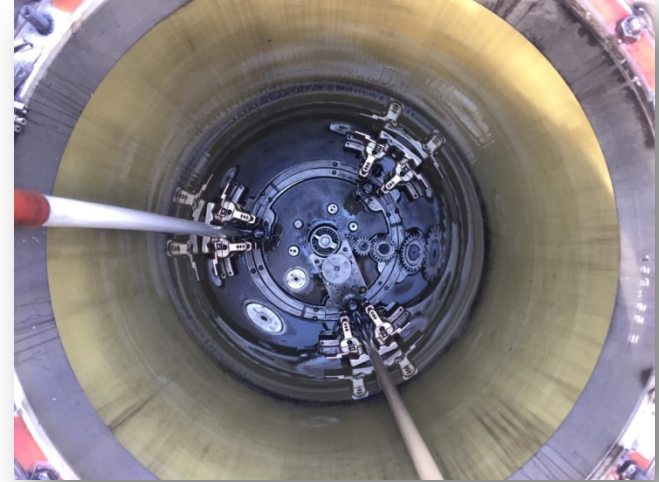


Maintenance work

Sandbar PST LTC Maintenance



Before



After



Maintenance work

Crossarms found during routine patrols



K50 Line



K42 Line

Other operations highlights

- Managed vegetation on approximately 3,500 right-of-way acres and removed 900 danger trees
- Built or made improvements to approximately 130 miles of access roads
- Utilized approximately 26,000 construction mats to construct 20 miles of temporary access roads
- Making good progress securing updated easements on Derby to Highgate line that clarify landowner/VELCO rights and responsibilities



2016 capital project program overview

Financial/schedule performance

- Placed capital assets > \$100M in service to improve transmission network reliability
- Implemented Phase 1 of PowerPlan project to improve project financial and asset tracking and management

Capital project program improvements

- Completed power accounting project
- Streamlined and incorporated project processes into PowerPlan tool
- Further developing internal capabilities of Project Controls and Project Management staff
- Continue to further project staffing strategies to standardize management tools and practices



Major concerns with Independent Transmission Projects impacts on future Vermont work

Significant project accomplishments

Line work

- Replaced over 300 inadequate transmission structures
- Replaced 55 structures in energized conditions due to system constraints
- Installed multiple steel poles on 345kV lines
- Started drilling work to replace PV20 cable in Lake Champlain
- 134 crossarms replaced
- 315 structures replaced

Substation work

- Started construction at Hartford and Ascutney Substations
- Initiated Essex STATCOM Refurbishment Project
- Substantially completed installation of security equipment at all stations
- Commissioned Newport Substation Project

Regulatory Accomplishments

- Received CPG and associated state and federal permits for Connecticut River Valley Project (9 month CPG review)
- Received CPG and associated state and federal permits for PV20 Project (10-month CPG review)



System planning accomplishments

- Completed analysis for NERC TPL-001-4 standard
 - No thermal concerns
 - No short circuit concerns
 - Local stability concerns requiring modifications to 6 locations
- DU support
 - Helped GMP file PPAs for Huntington Falls hydro project
 - Performed system impact study for St Albans load addition
 - Performed NTA screening and evaluated system impacts of the BED series reactors
 - Evaluated options to increase Sheffield-Highgate export limit
 - Operational
 - Transmission and subtransmission
 - Energy storage (analysis performed by Quanta Technology)
- Project support for St. Albans, Barre, Essex STATCOM, Ascutney SVC
- Worked with ISO-NE on independent transmission projects in VT

In conclusion

- 2016 was a good year but not finished
- More forced outages than we would like, but still good
- New Newport substation
- Permits received for PV20, CRVP
- 2017 challenges
 - Major construction projects
 - PV20
 - CRVP
 - Regulatory changes
 - Cyber security
 - Geomagnetic disturbance impacts
 - Renewables integration
 - Operationalizing Vermont Weather Analytics Center
 - Impacts of Vermont Green Line (Anbaric/NGrid) and New England Clean Power Link (TDI)